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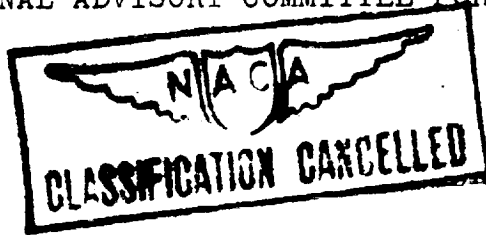
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(Revised R-5)

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS



~~RESTRICTED~~ R.B.

MEMORANDUM REPORT

for the

Bureau of Aeronautics, Navy Department
EFFECT OF NORMAL PRESSURE ON THE CRITICAL
COMPRESSIVE STRESS OF CURVED SHEET

By Norman Rafel

Langley Memorial Aeronautical Laboratory
Langley Field, Va.

CLASSIFICATION CHANGED

To UNCLASSIFIED

H. L. Dryden per NACA
Release Form # 1130

By authority of

Date 10-7-52

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To be returned to
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Advisory Committee
for Aeronautics
Washington, D. C.

August 25, 1942

WR L-258

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MEMORANDUM REPORT

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EFFECT OF NORMAL PRESSURE ON THE CRITICAL
COMPRESSIVE STRESS OF CURVED SHEET

By Norman Rafel

In order to study experimentally the effect of normal pressure on the critical compressive stress for thin curved sheet, two specimens were constructed, as shown in figures 1 and 2. These specimens are designated by their respective rib spacings of 10 inches and 30 inches.

As shown in figure 3, each specimen was tested with flat ends in the 1,200,000-pound-capacity testing machine in the NACA structures research laboratory. The loading head of this machine is laterally supported during tests by the heavy side columns of the machine in such a manner as not to affect the accuracy of load measurement. The ends of the specimen were ground flat and parallel in a planer specially adapted for this purpose. The detailed operations of finishing the ends of the specimen and the loading of it were planned so as to give uniform strain distribution throughout the specimen; strain distribution during the test was checked by wire-resistance-type strain gages.

Normal pressure was applied by admitting compressed air into the specimen. A mercury manometer calibrated in

5. The compressive stress - normal pressure curve at which the buckles disappeared on unloading is always below the compressive stress - normal pressure curve at which the buckles appeared. (See fig. 8.)

6. The relationship between compressive stress and normal pressure at which buckles disappeared is independent of whether the buckles were made to disappear by increase of normal pressure or decrease of compressive stress. (See fig. 8.)

Langley Memorial Aeronautical Laboratory,
National Advisory Committee for Aeronautics,
Langley Field, Va., August 25, 1942.

Norman Rafel

Norman Rafel
Assistant Aeronautical Engineer.

Approved:
Elton W. Miller,
Head Mechanical Engineer.

VDP

$\frac{3}{16}$ " diam. rivets spaced at $\frac{5}{8}$ " on outside flanges
and at 1" on inside ribs.

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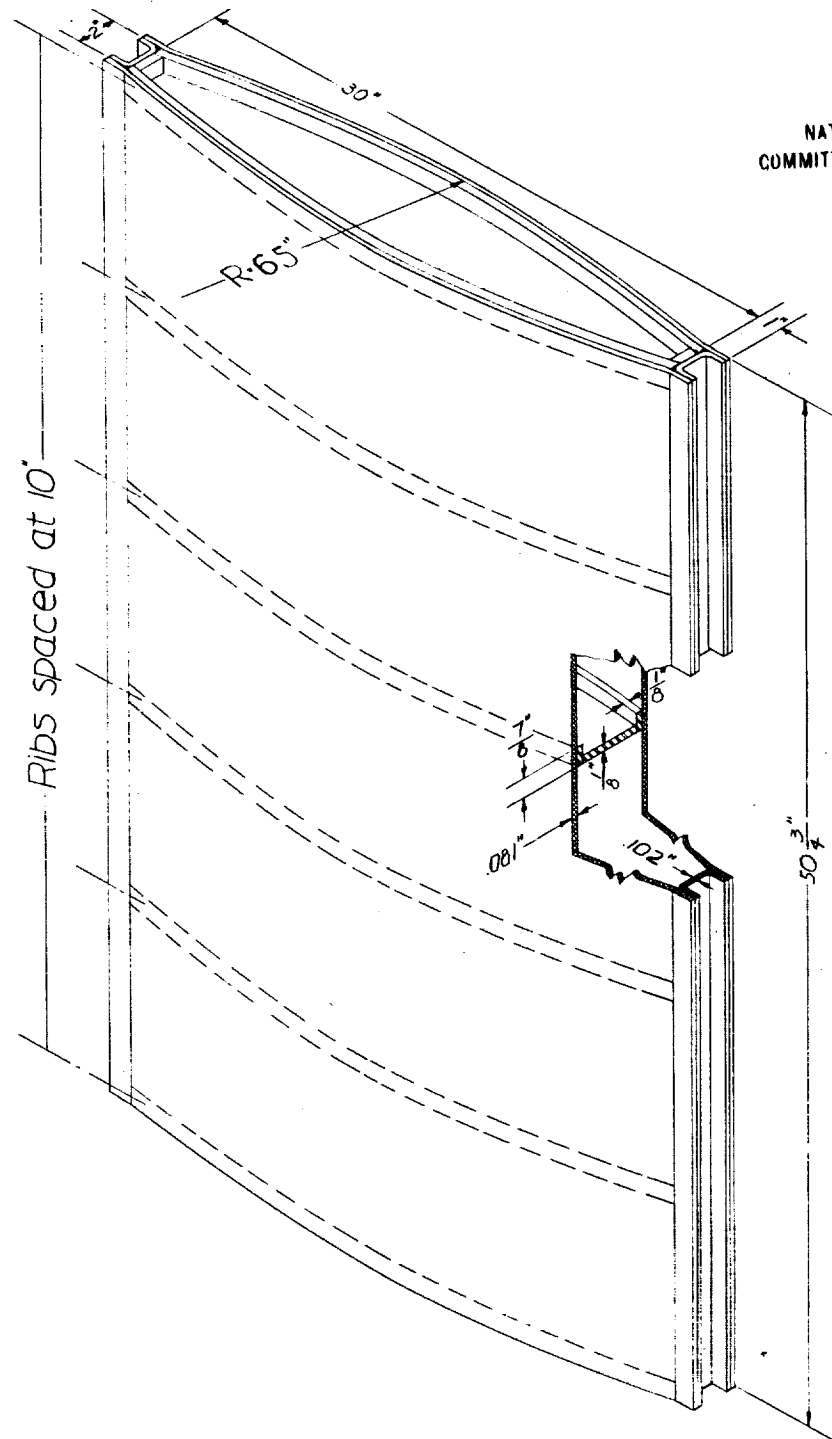


Figure 1.-Specimen with 10-inch rib spacing.

$\frac{3}{16}$ " diam rivets spaced at $\frac{5}{8}$ " on outside flanges and at 1" on inside ribs.

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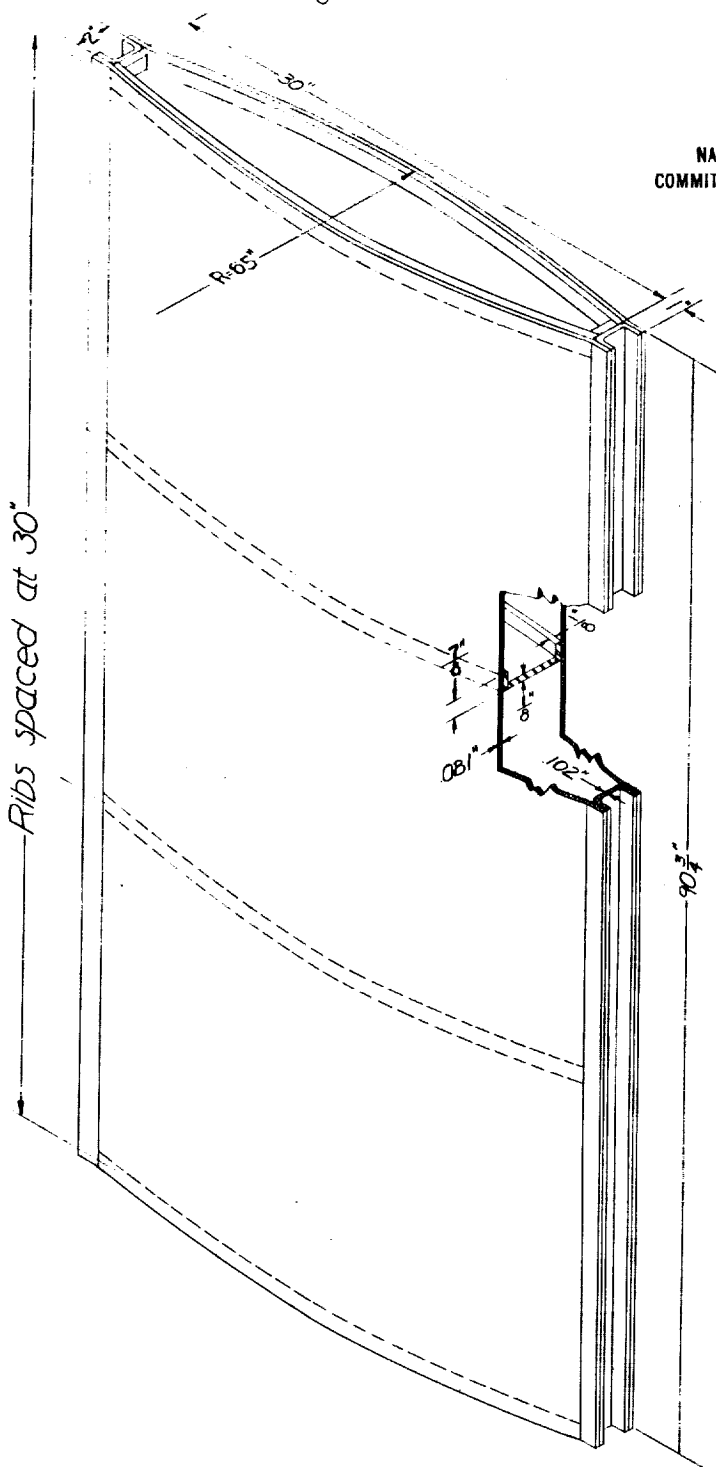


Figure 2.- Specimen with 30-inch rib spacing.

FIGURE 3. - SPECIMEN WITH 30-INCH RIB SPACING BUCKLED
IN 1,200,000 - POUND CAPACITY TESTING
MACHINE.
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